Figure 1.

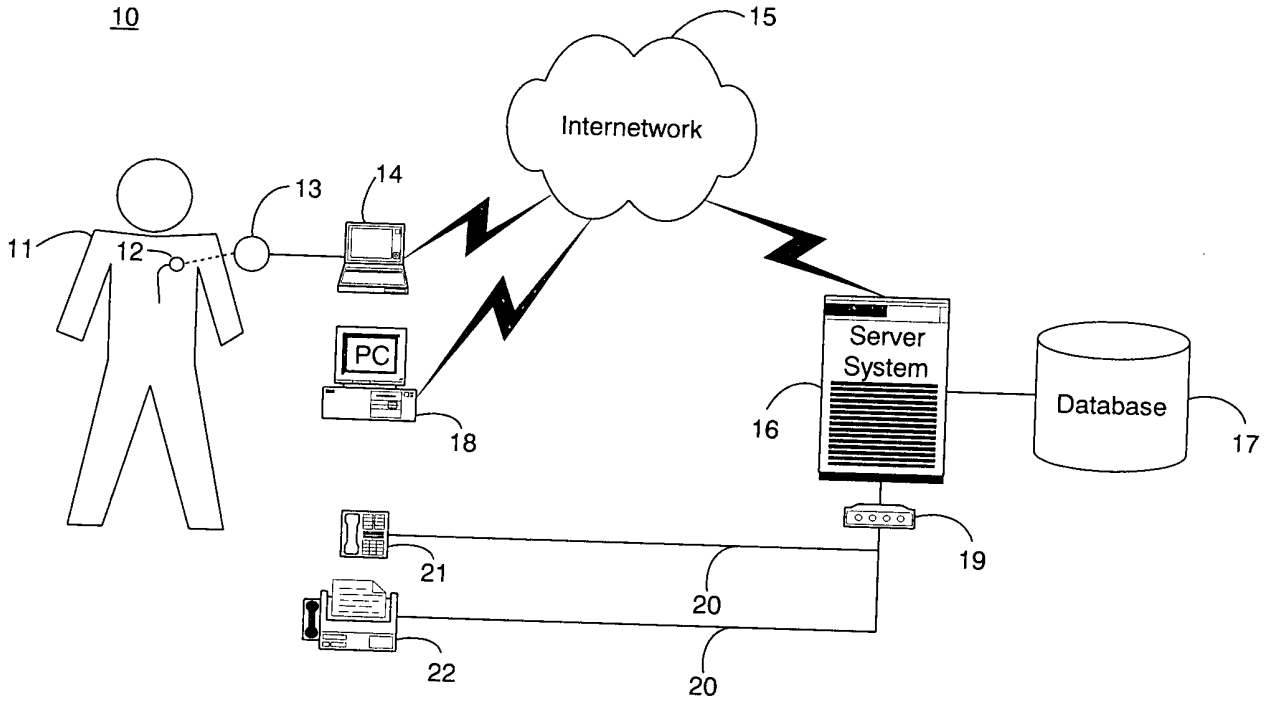

10
15
Internetwork
13
14
11
12
PC
18
Server
System
16
Database
17
21
19
20
22
20

Figure 2.

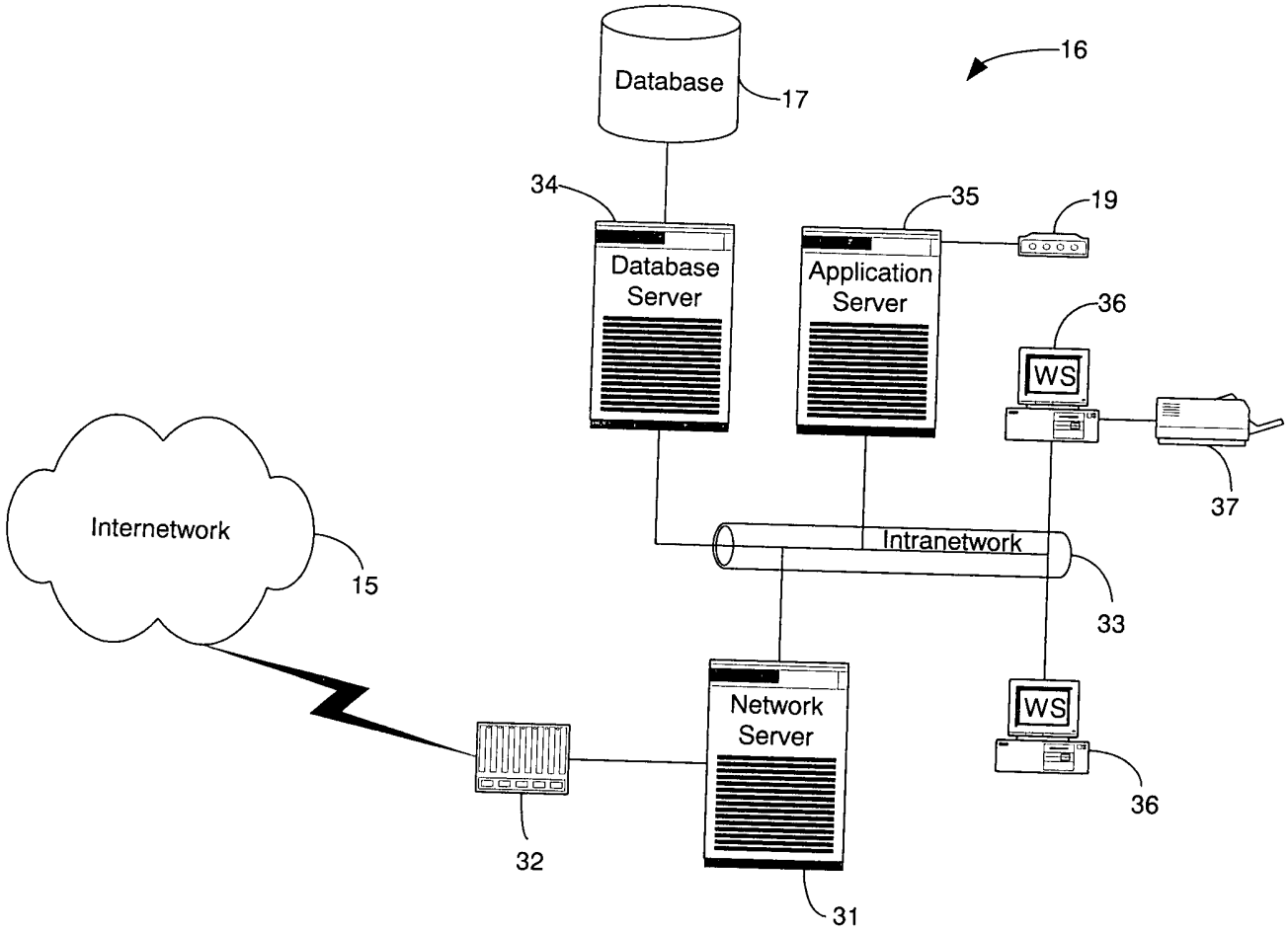

Database
17
16
34
35
19
Database Server
Application Server
36
WS
37
Internetwork
15
Intranetwork
33
Network Server
WS
36
32
31

Figure 3.

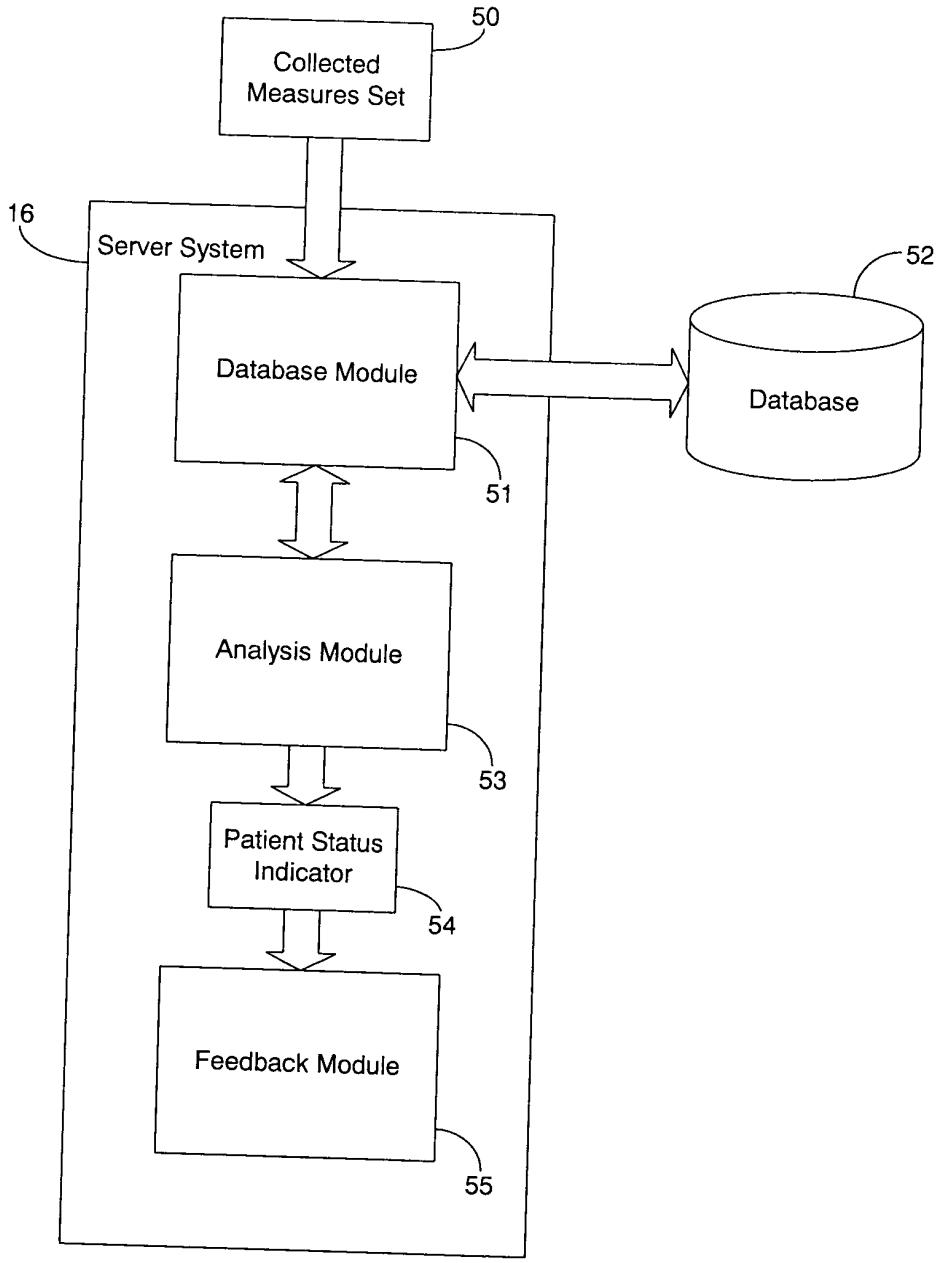
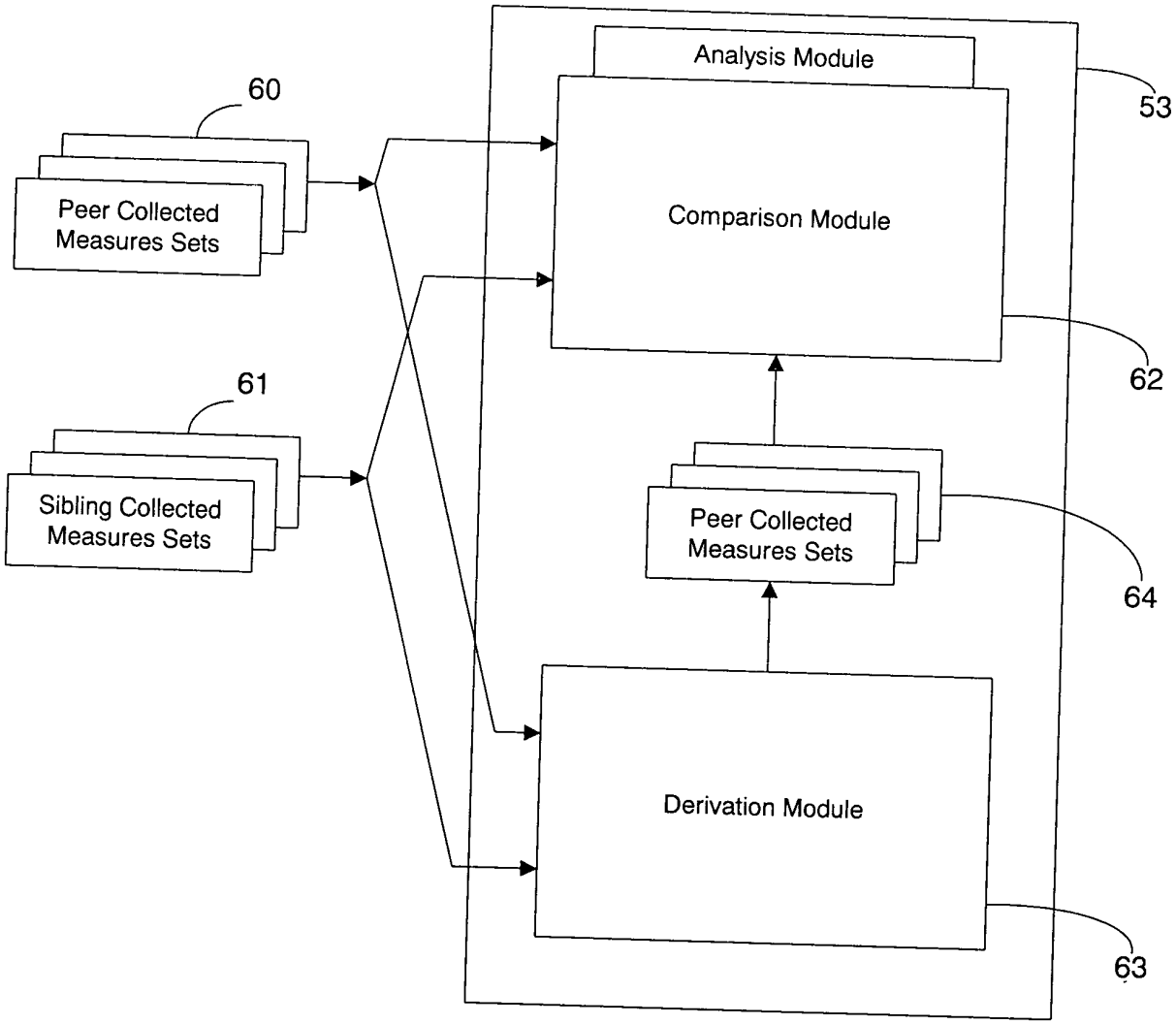

50
Collected Measures Set
16
Server System
52
Database Module
Database
51
Analysis Module
53
Patient Status Indicator
54
Feedback Module
55

Figure 4.


Analysis Module
53
60
Peer Collected Measures Sets
Comparison Module
62
61
Sibling Collected Measures Sets
Peer Collected Measures Sets
64
Derivation Module
63

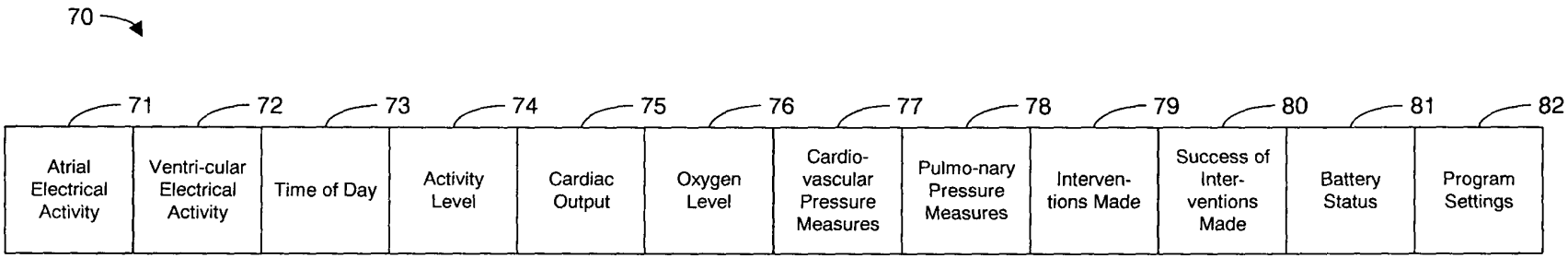


Figure 5.

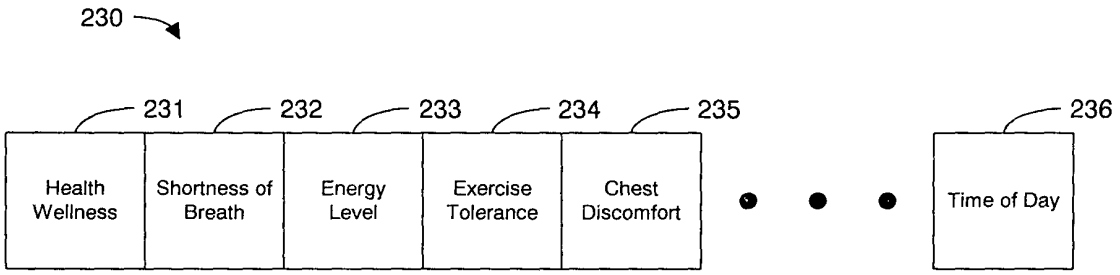


Figure 15.

Figure 6.

Patient 1

Set 0				Set n-2	Set n-1	Set n
X_0	•	•	•	X_{n-2}	X_{n-1}	X_n
Y_0	•	•	•	Y_{n-2}	Y_{n-1}	Y_n
Z_0	•	•	•	Z_{n-2}	Z_{n-1}	Z_n

time →

Patient 2

Set 0				Set n-2	Set n-1	Set n
$X_{0'}$	•	•	•	$X_{n-2'}$	$X_{n-1'}$	$X_{n'}$
$Y_{0'}$	•	•	•	$Y_{n-2'}$	$Y_{n-1'}$	$Y_{n'}$
$Z_{0'}$	•	•	•	$Z_{n-2'}$	$Z_{n-1'}$	$Z_{n'}$

time →

Patient 3

Set 0				Set n-2	Set n-1	Set n
$X_{0''}$	•	•	•	$X_{n-2''}$	$X_{n-1''}$	$X_{n''}$
$Y_{0''}$	•	•	•	$Y_{n-2''}$	$Y_{n-1''}$	$Y_{n''}$
$Z_{0''}$	•	•	•	$Z_{n-2''}$	$Z_{n-1''}$	$Z_{n''}$

time →

Figure 7.

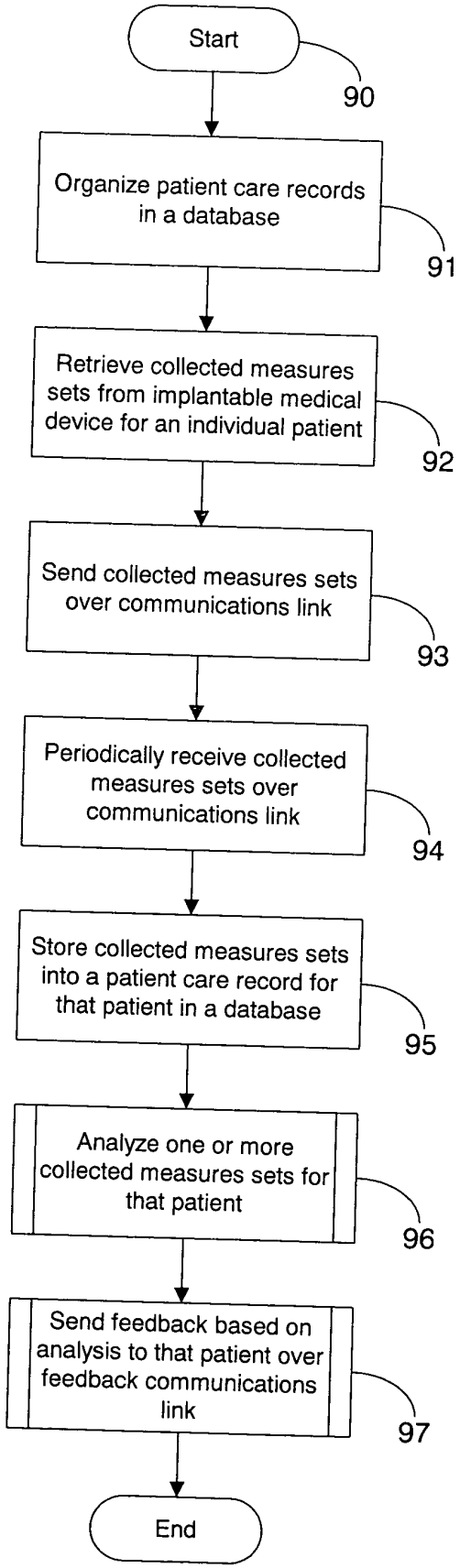

Start
90
Organize patient care records in a database
91
Retrieve collected measures sets from implantable medical device for an individual patient
92
Send collected measures sets over communications link
93
Periodically receive collected measures sets over communications link
94
Store collected measures sets into a patient care record for that patient in a database
95
Analyze one or more collected measures sets for that patient
96
Send feedback based on analysis to that patient over feedback communications link
97
End

Figure 8.

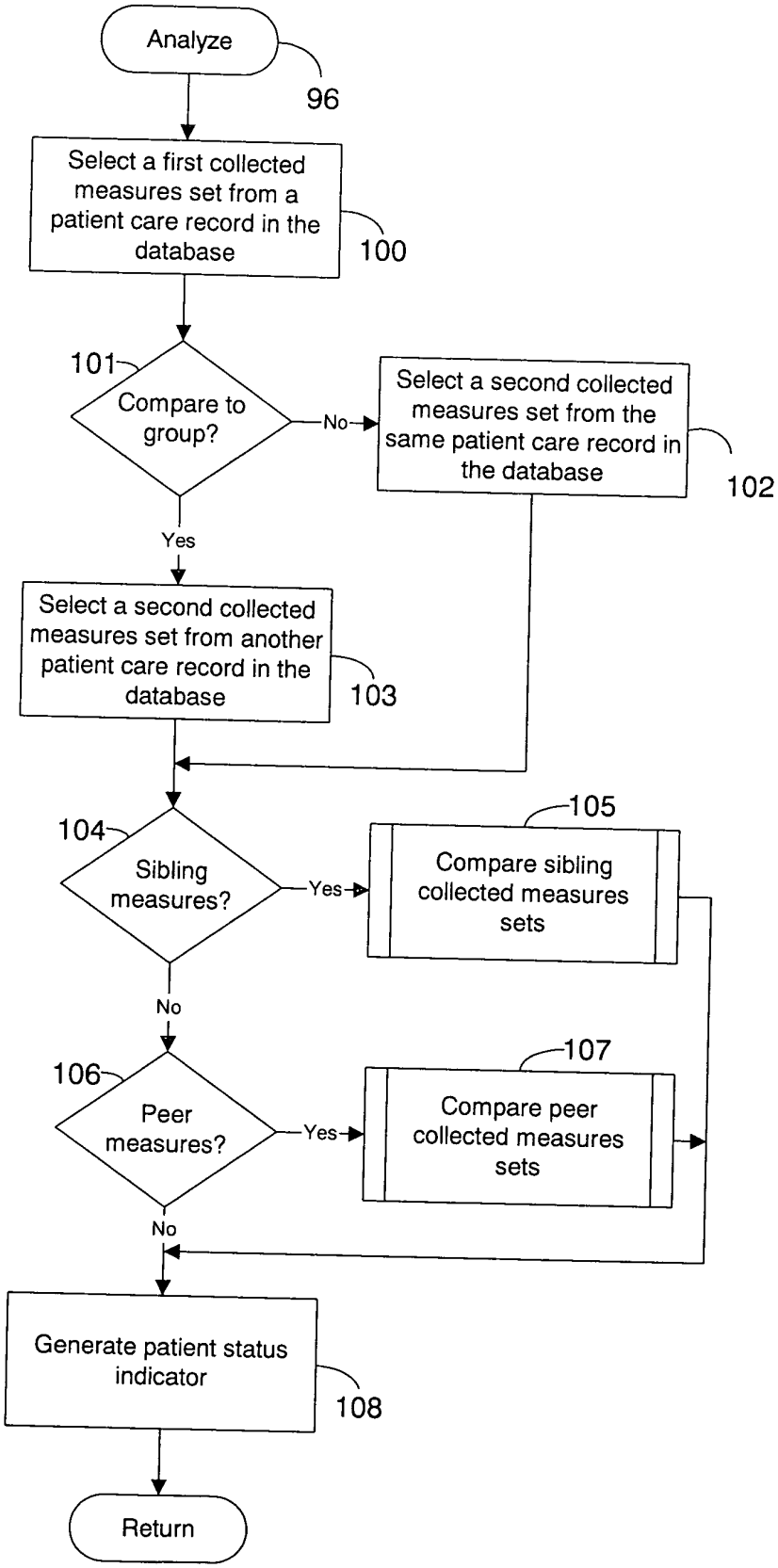

Analyze
96
Select a first collected measures set from a patient care record in the database
100
101
Compare to group?
No
Select a second collected measures set from the same patient care record in the database
102
Yes
Select a second collected measures set from another patient care record in the database
103
104
Sibling measures?
Yes
105
Compare sibling collected measures sets
No
106
Peer measures?
Yes
107
Compare peer collected measures sets
No
Generate patient status indicator
108
Return

Figure 9.

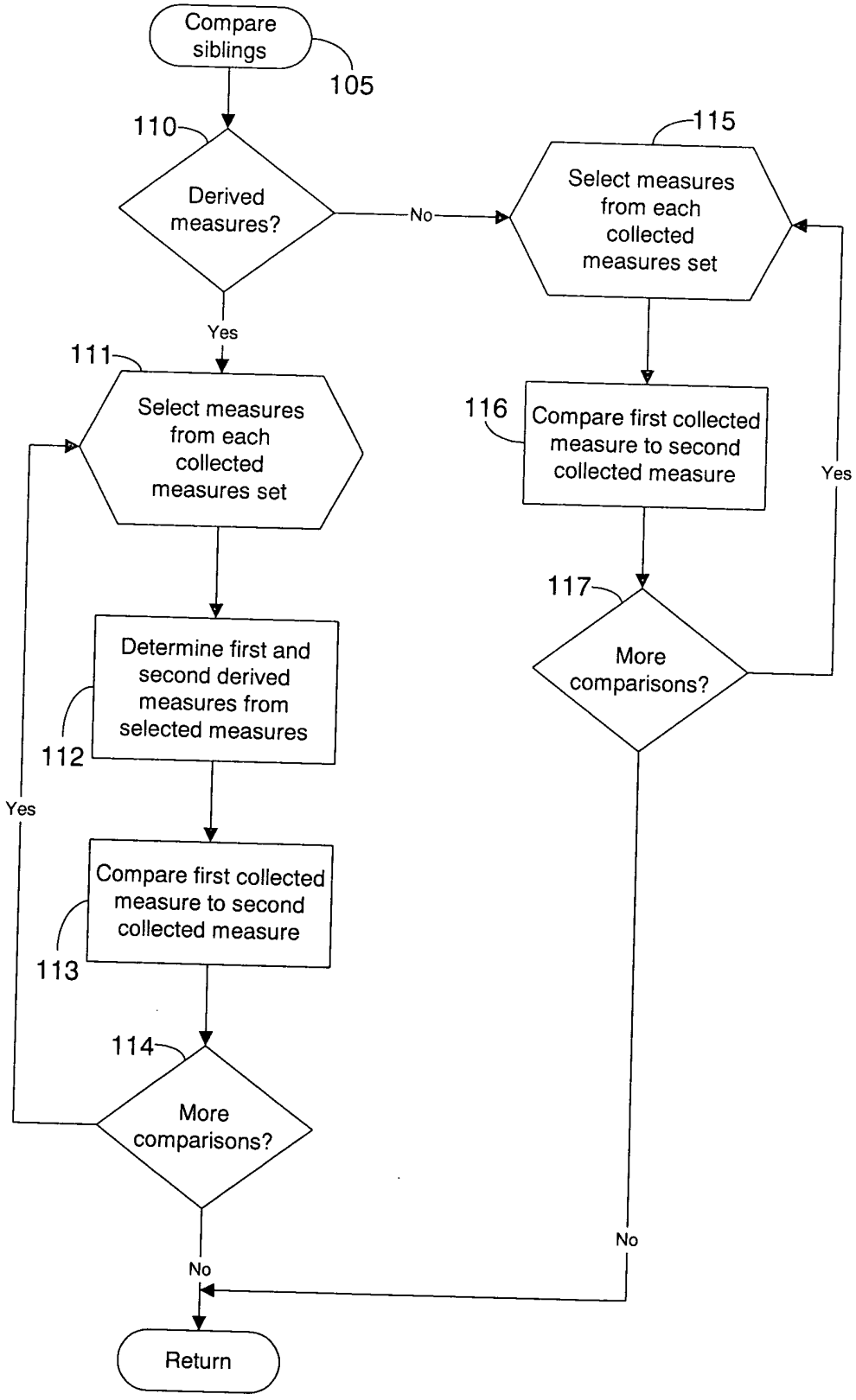

Compare siblings
105
110
Derived measures?
No
115
Select measures from each collected measures set
Yes
111
Select measures from each collected measures set
116
Compare first collected measure to second collected measure
Yes
117
More comparisons?
Determine first and second derived measures from selected measures
112
Yes
Compare first collected measure to second collected measure
113
114
More comparisons?
No
No
Return

Figure 10A.

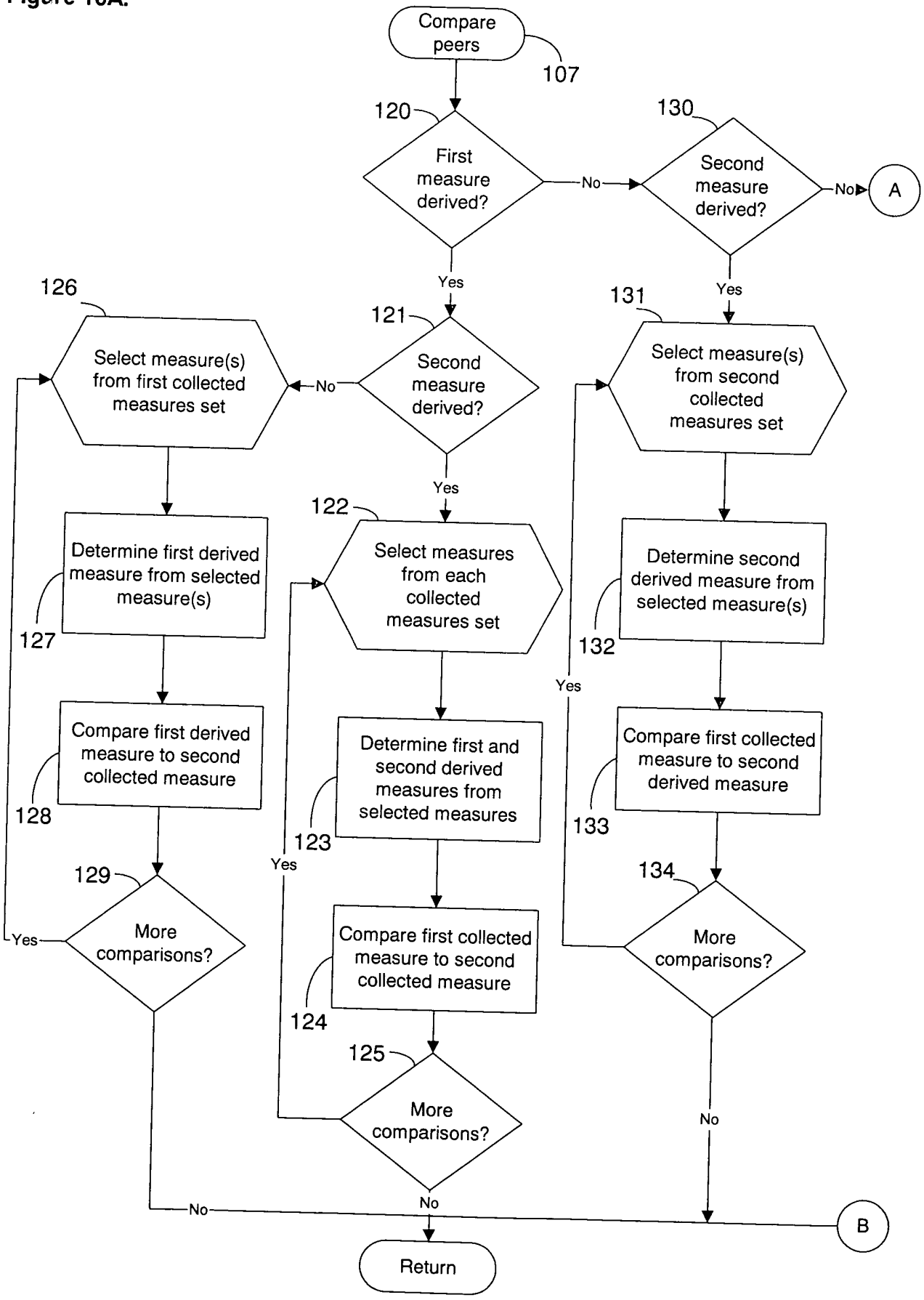

Compare peers
107
120
First measure derived?
No
130
Second measure derived?
No
A
Yes
Yes
126
121
131
Select measure(s) from first collected measures set
No
Second measure derived?
Select measure(s) from second collected measures set
Yes
Yes
122
Determine first derived measure from selected measure(s)
127
Select measures from each collected measures set
Determine second derived measure from selected measure(s)
132
Yes
Compare first derived measure to second collected measure
128
Determine first and second derived measures from selected measures
123
Compare first collected measure to second derived measure
133
129
Yes
Yes
134
More comparisons?
Compare first collected measure to second collected measure
124
More comparisons?
125
More comparisons?
No
No
No
B
Return

Figure 10B.

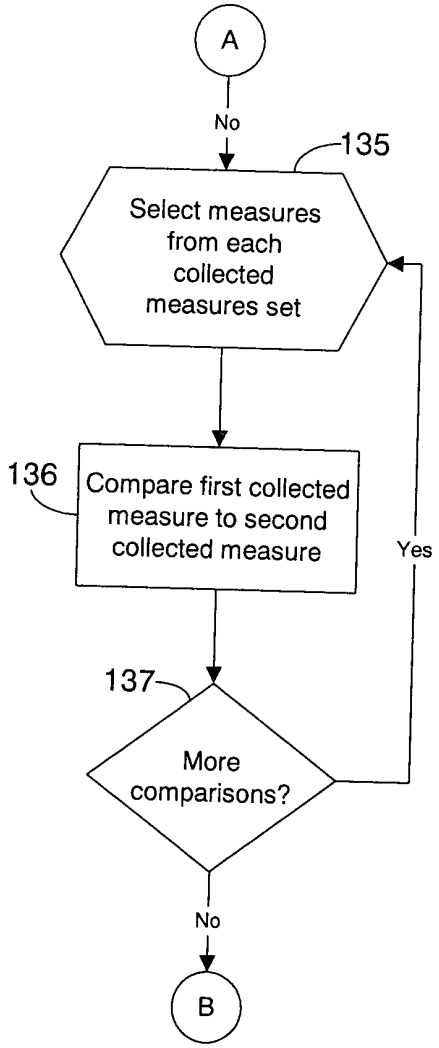

A
No
135
Select measures from each collected measures set
136
Compare first collected measure to second collected measure
Yes
137
More comparisons?
No
B

Figure 11.

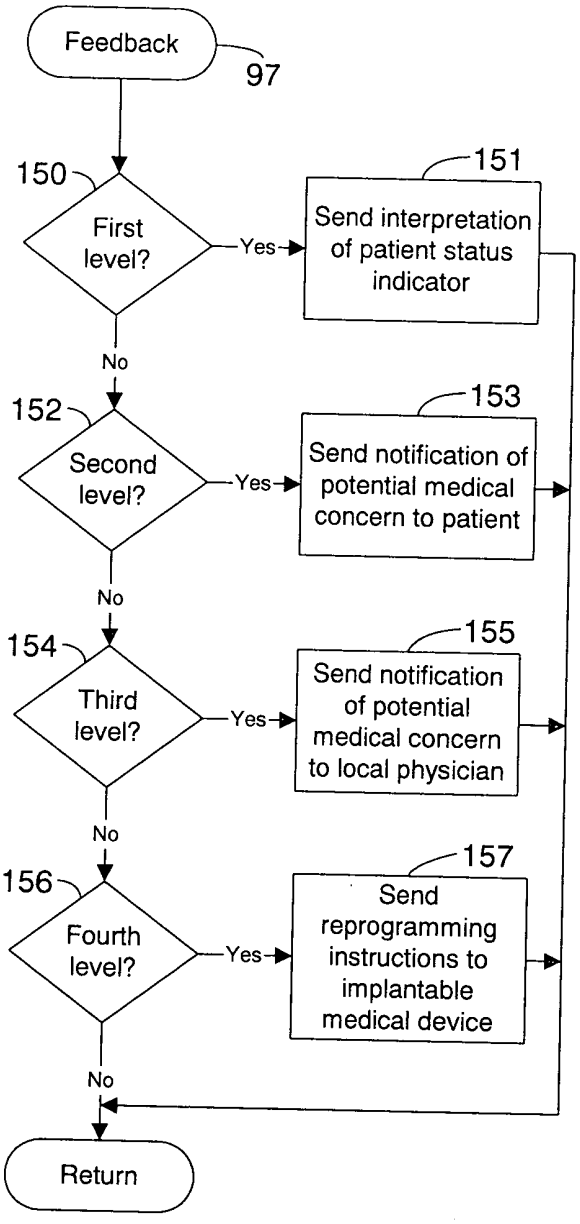

Feedback
97
150
First level?
Yes
151
Send interpretation of patient status indicator
No
152
Second level?
Yes
153
Send notification of potential medical concern to patient
No
154
Third level?
Yes
155
Send notification of potential medical concern to local physician
No
156
Fourth level?
Yes
157
Send reprogramming instructions to implantable medical device
No
Return

Figure 12.

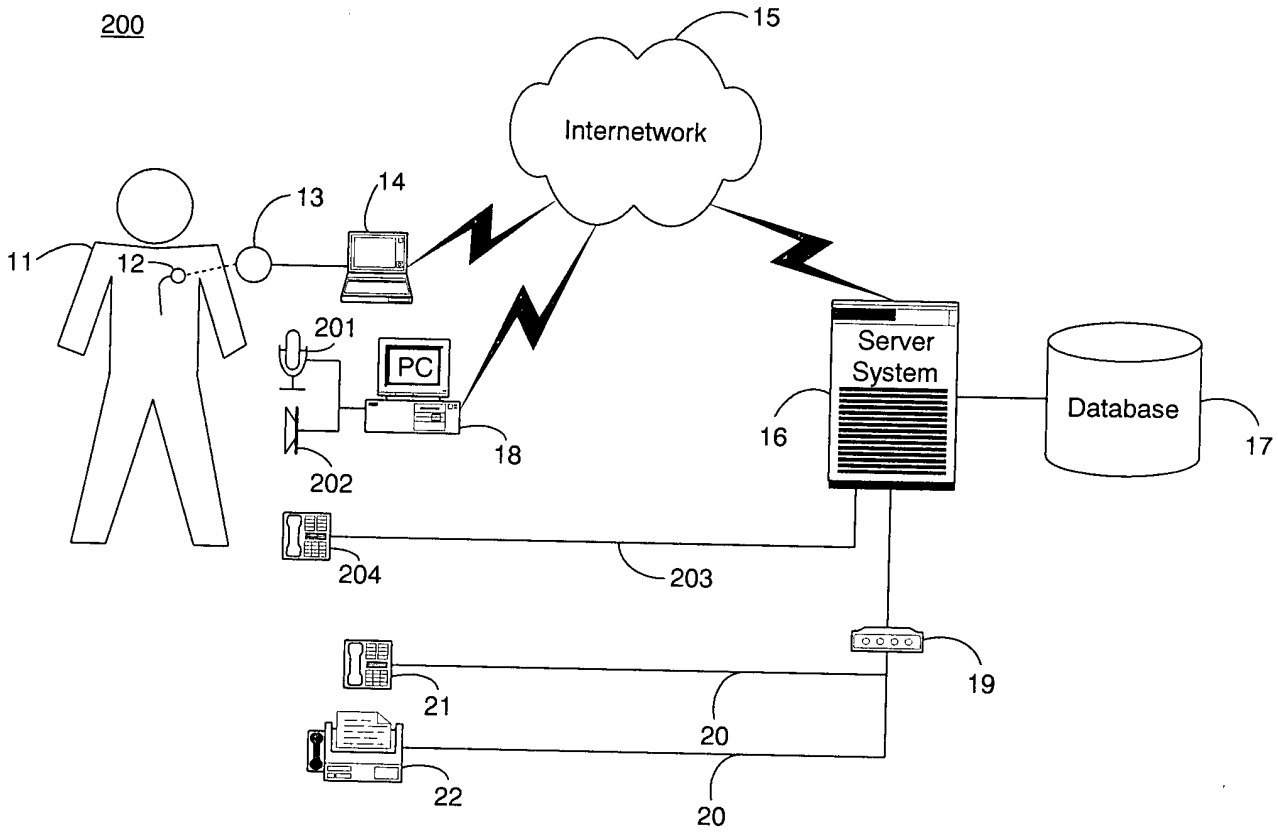

200
15
Internetwork
13
14
11
12
201
PC
18
Server
System
Database
16
17
202
204
203
19
21
20
22
20

Figure 13.

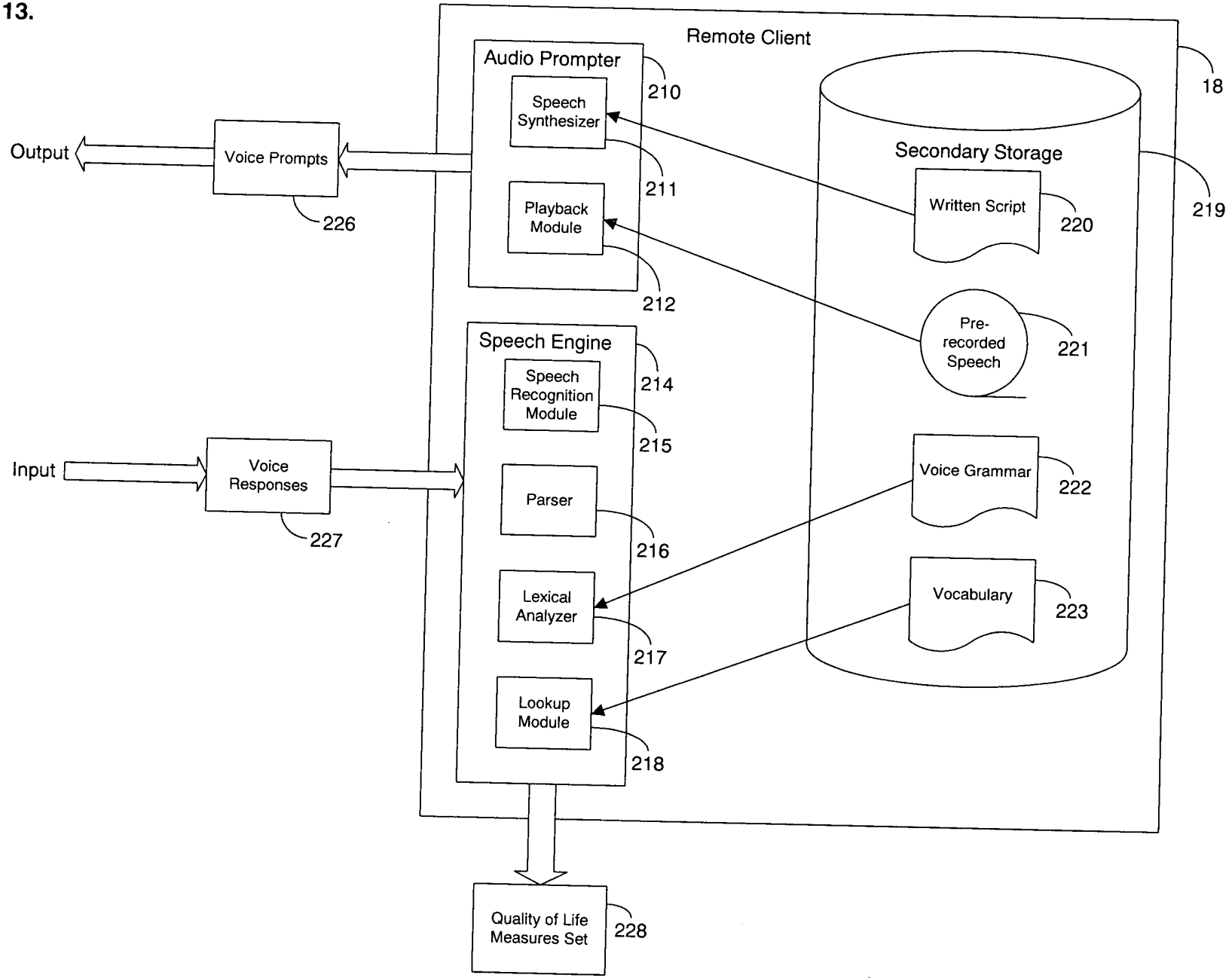

Remote Client
18
Audio Prompter
210
Speech Synthesizer
211
Playback Module
212
Output
Voice Prompts
226
Secondary Storage
219
Written Script
220
Pre-recorded Speech
221
Speech Engine
214
Speech Recognition Module
215
Parser
216
Lexical Analyzer
217
Lookup Module
218
Input
Voice Responses
227
Voice Grammar
222
Vocabulary
223
Quality of Life Measures Set
228

Figure 14.

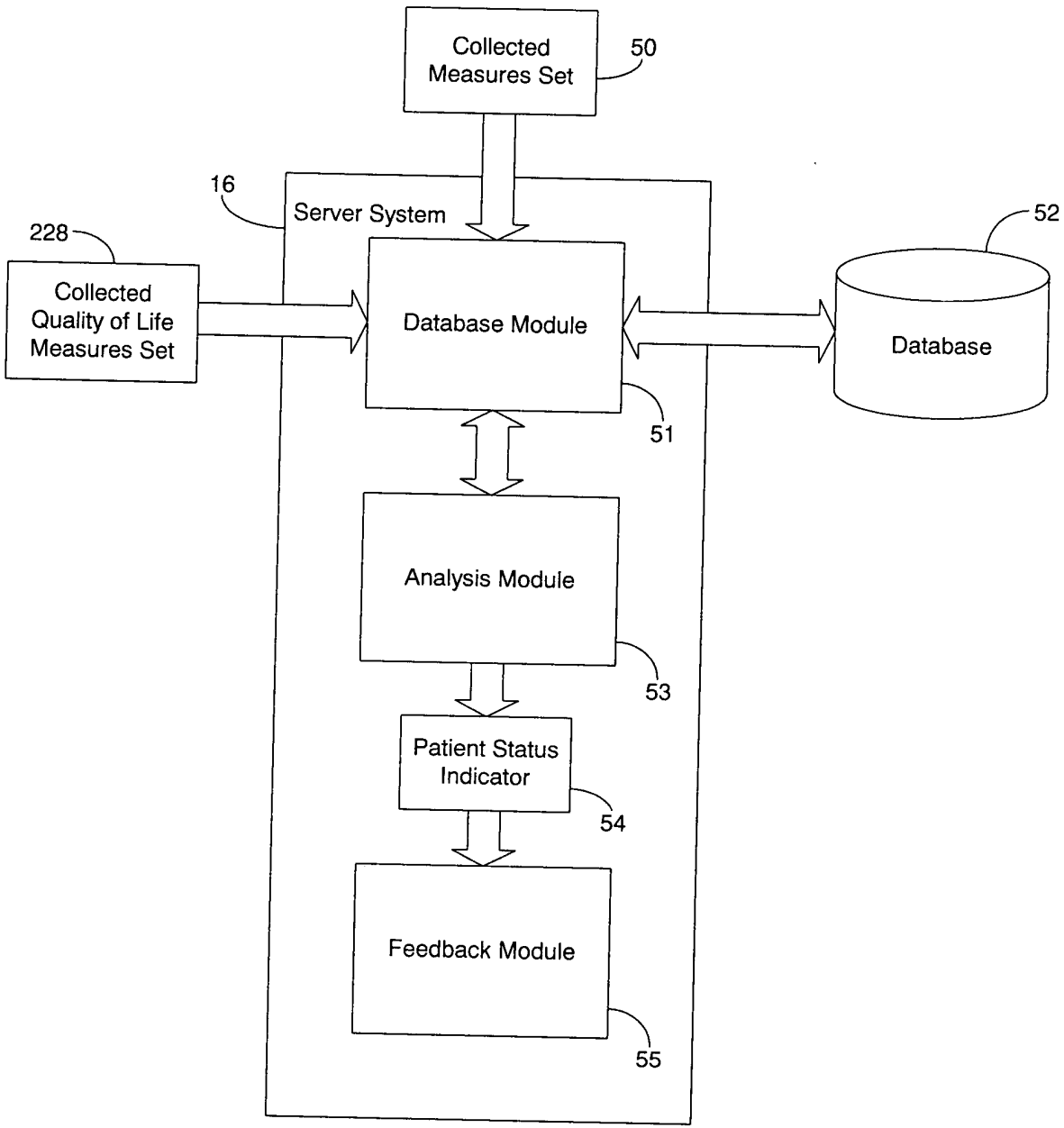

Collected Measures Set
50
16
Server System
228
Collected Quality of Life Measures Set
Database Module
51
52
Database
Analysis Module
53
Patient Status Indicator
54
Feedback Module
55

Figure 16A.

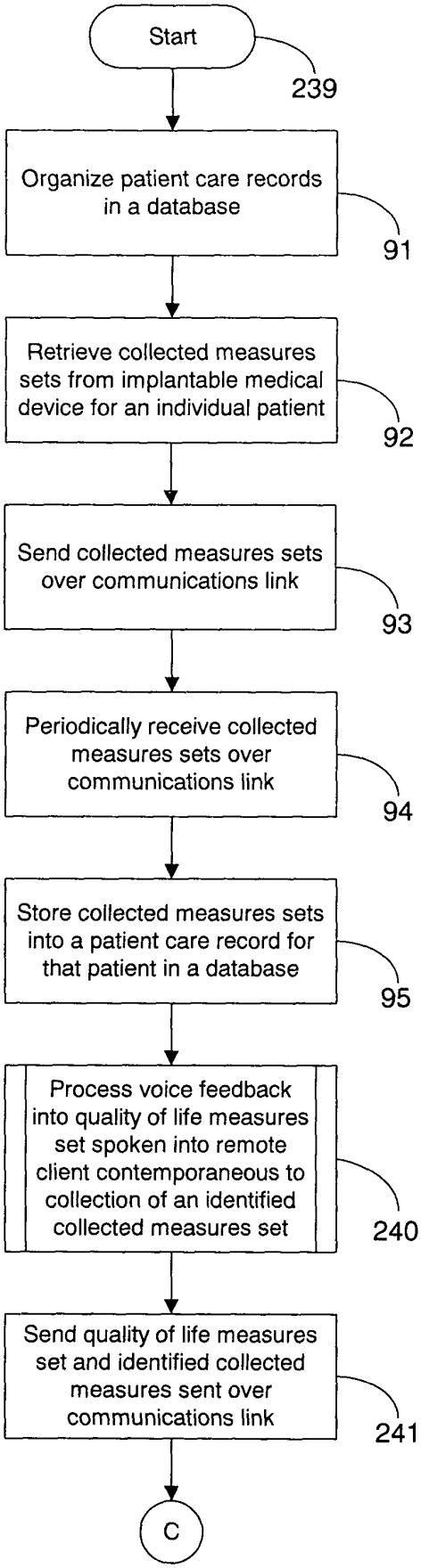

Start
239
Organize patient care records in a database
91
Retrieve collected measures sets from implantable medical device for an individual patient
92
Send collected measures sets over communications link
93
Periodically receive collected measures sets over communications link
94
Store collected measures sets into a patient care record for that patient in a database
95
Process voice feedback into quality of life measures set spoken into remote client contemporaneous to collection of an identified collected measures set
240
Send quality of life measures set and identified collected measures sent over communications link
241
C

Figure 16B.

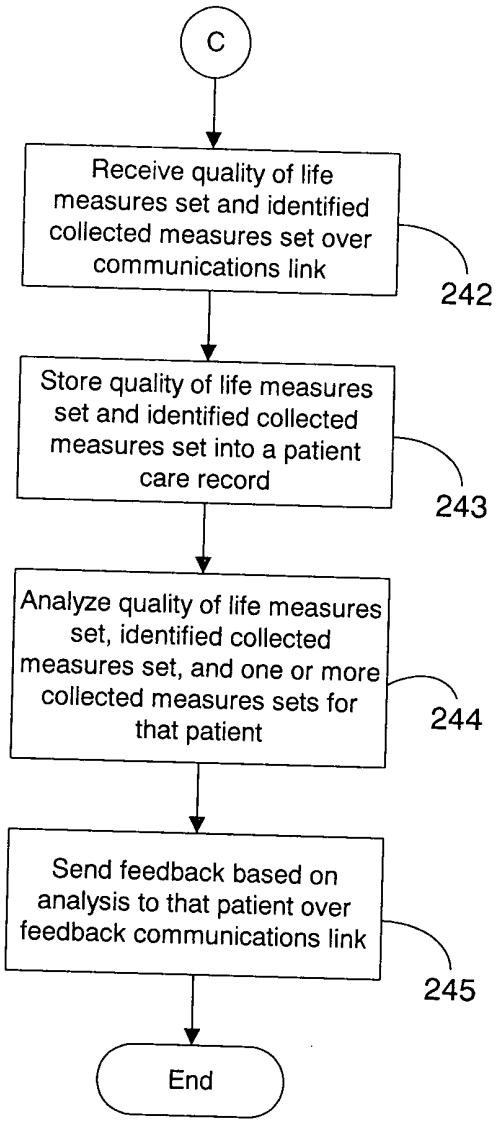

C
Receive quality of life measures set and identified collected measures set over communications link
242
Store quality of life measures set and identified collected measures set into a patient care record
243
Analyze quality of life measures set, identified collected measures set, and one or more collected measures sets for that patient
244
Send feedback based on analysis to that patient over feedback communications link
245
End

Figure 17.

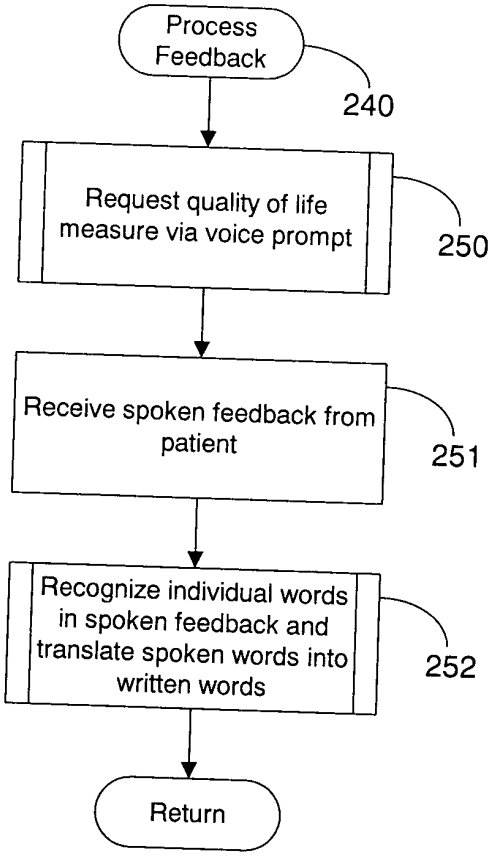

Process Feedback
240
Request quality of life measure via voice prompt
250
Receive spoken feedback from patient
251
Recognize individual words in spoken feedback and translate spoken words into written words
252
Return

Figure 18.

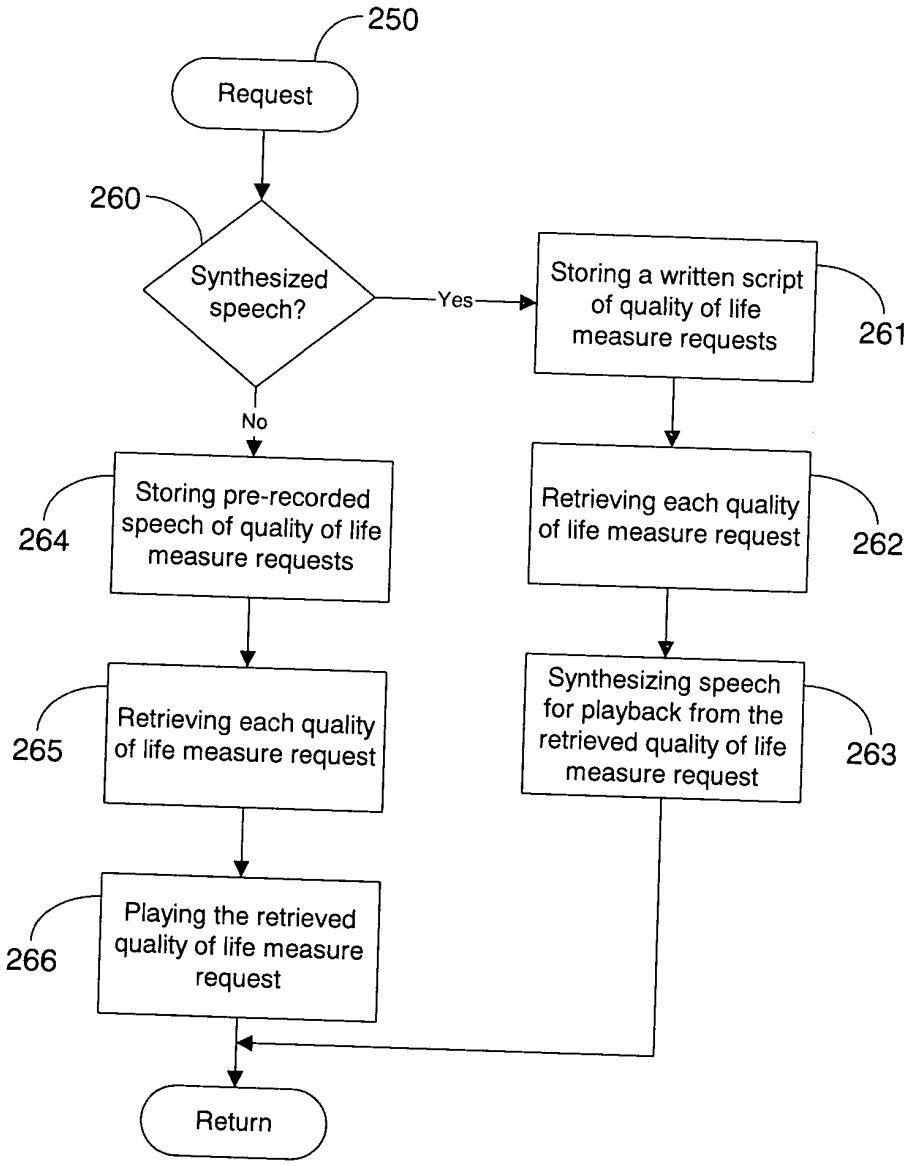

250
Request
260
Synthesized speech?
Yes
No
Storing a written script of quality of life measure requests
261
Retrieving each quality of life measure request
262
Synthesizing speech for playback from the retrieved quality of life measure request
263
Storing pre-recorded speech of quality of life measure requests
264
Retrieving each quality of life measure request
265
Playing the retrieved quality of life measure request
266
Return

Figure 19.

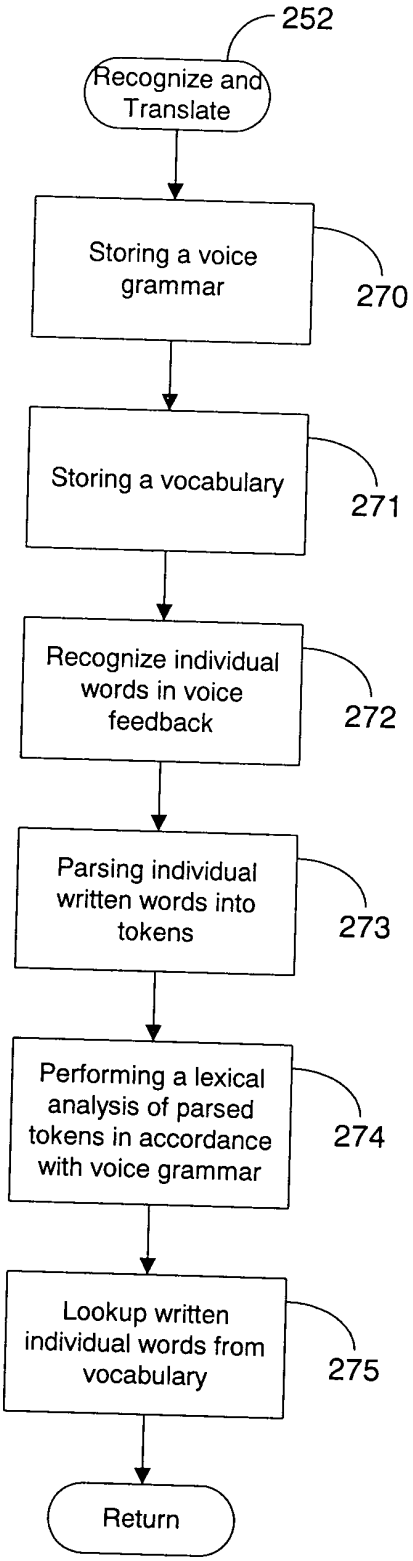
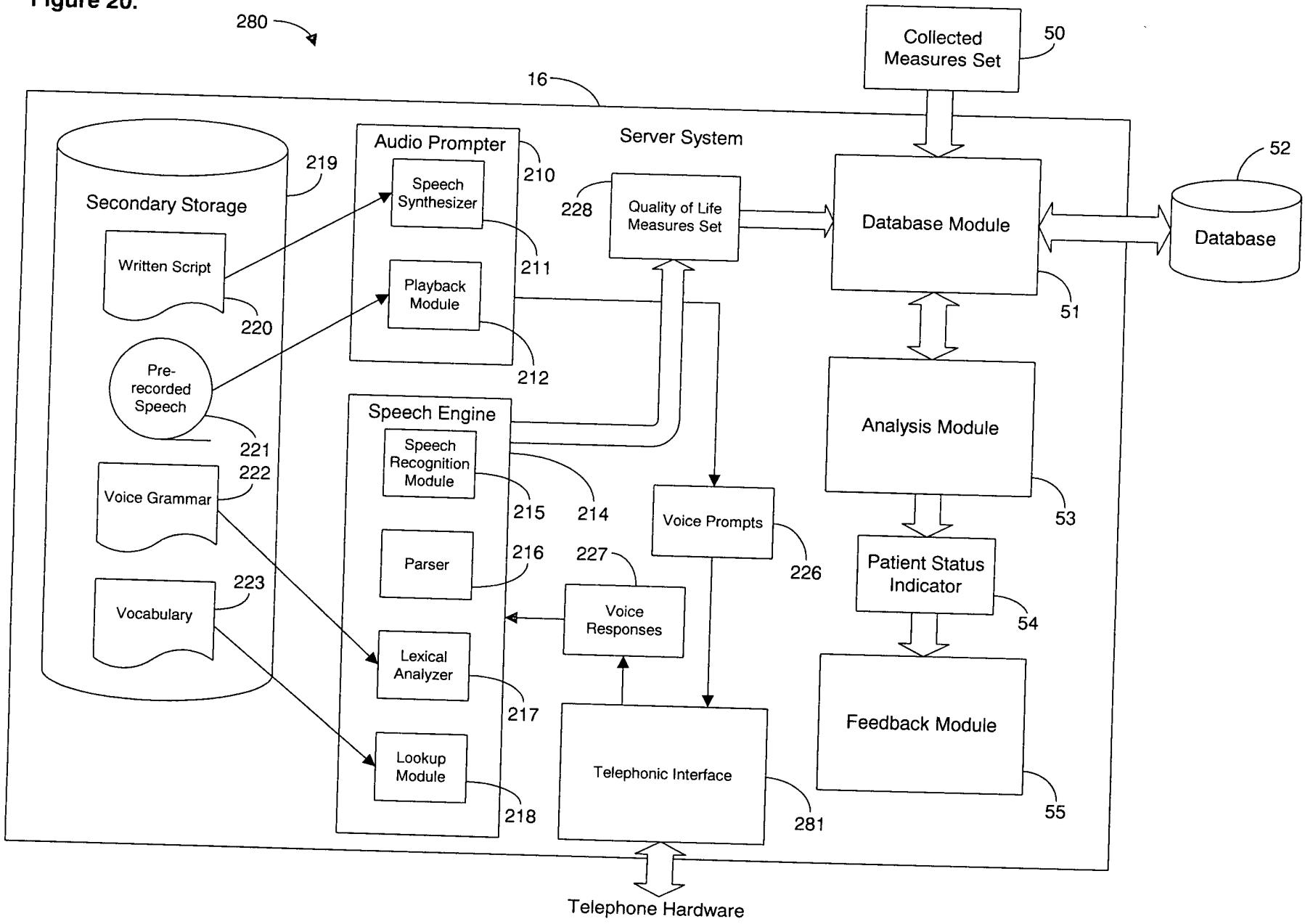

252
Recognize and Translate
Storing a voice grammar
270
Storing a vocabulary
271
Recognize individual words in voice feedback
272
Parsing individual written words into tokens
273
Performing a lexical analysis of parsed tokens in accordance with voice grammar
274
Lookup written individual words from vocabulary
275
Return

Figure 20.


280
Collected Measures Set
50
16
Server System
Audio Prompter
210
Speech Synthesizer
211
Playback Module
212
Secondary Storage
219
Written Script
220
Pre-recorded Speech
221
Voice Grammar
222
Vocabulary
223
228
Quality of Life Measures Set
Database Module
51
52
Database
Analysis Module
53
Speech Engine
Speech Recognition Module
214
215
Parser
216
Lexical Analyzer
217
Lookup Module
218
Voice Prompts
226
227
Voice Responses
Patient Status Indicator
54
Feedback Module
55
Telephonic Interface
281
Telephone Hardware